

## Strategy and Tactics in the Design of Forms

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*This paper reviews research investigations which relate the design of a form to the difficulties people have in completing the form.*

*A distinction is drawn between researchable issues which will have relevance to many kinds of forms (e.g., asking form-fillers to delete what does not apply) and issues which are specific to particular kinds of form (e.g., the interpretation of terminology).*

*After suggesting that fruitful interactions could be developed between those asking strategic and those asking tactical questions, it is concluded that those who seek simple recipes for designing adequate forms have failed to understand the complexities of the problem.*

There is probably no administrative procedure which does not require the use of at least one form.

*Management Services Handbook*  
UK Civil Service Department, 1975

### 1. *Introduction*

Forms vary in their design and function. They are used by populations as diverse as laymen, professionals, and machines. Therefore few definitions of a form are likely to be useful for all purposes. Nevertheless there is some advantage in thinking of a form as being a structured question and answer dialogue, in which the questions are written and the kinds of answers permitted may be highly constrained. Such a description reminds us that technological advances, which may reduce the amount of paper in circulation, will not necessarily reduce the number of forms with which we wrestle. Whether the questions come from a line-printer or a visual display unit, whether the answers are given through a keyboard or by use of a light-pen, all the major ingredients of a form are likely to be there. There is no reason why the language of questions displayed on a television screen should be any

easier to comprehend than the language at present on printed forms. Indeed the risk is that the spatial constraints of some visual displays may mean introducing still more abbreviations and jargon terms. So there is undoubtedly a long term need for research into the various aspects of form design. What is it that makes a good form good?

One of the characteristics of forms, and one which makes it difficult to know how to tackle the problem of form design, is that there are so many different kinds of questions that can occur. This is illustrated in Figure 1, which shows a typical form issued by travel agents.

On this form there are questions requiring a free verbal response such as name and address. Such answers may be completely unconstrained as in 1a, or there may be horizontal lines provided as in 1b, or even boxes for separate characters as in 1c. Other questions may require the form-filler to make a selection among several alternatives (e.g., item 2). In item 2 the selections are denoted by ticks. Ticking can also be used to answer yes/no questions, but on this particular form the instruction is to delete as required (e.g., item 3). A different kind of question is shown by item 4. This is a small matrix where the answers are given with reference to information in both the row and the column headings of the matrix.

Figure 2 illustrates a form on which the answer to the multiple choice question was recorded as a code number. In Figure 2a the code is simply the number of the option selected. This can be a useful technique for saving space when the same set of options apply to several items (e.g., Figure 2b), and it is a form of responding that lends itself to direct computer compatibility since the written numbers can be replaced by a keypad that records the codes directly onto magnetic tape (e.g., the modified cassette recorder shown in 2c). However, when the sets of alternatives are not mutually exclusive (as for example in 2b where a vehicle may have several defects) the coding procedure may become much more complex. Such systems may require that the sets of options are translated into a single answer code. Wright, Aldrich, and Wilcox (1977) have shown that such complex coding systems may have the disadvantage of being error-prone.

In view of this diversity of kinds of questions and response constraint, if you were shown a form and asked to revise it, just where would you start? You might read it through and hope to spot some obvious pieces of nonsense, but could you do more than this? If you turned to the research literature where would you look? *Psychological*

| RESERVATIONS   |             |   |  |  |                | Telephone Booking Ref.:  |  | Child Reduction Ref.: |  |                   |             |       |  |            |                |               |  |  |  |
|--|-------------|---|--|--|----------------|--|--|-----------------------|--|-------------------|-------------|-------|--|------------|----------------|---------------|--|--|--|
| <b>Blue Sky Holidays Ex Gatwick Tel : 0342-27131 or 01-836 8499</b><br><b>Blue Sky Holidays Ex Manchester Tel : 01-836 8499 or 0342-27151</b><br>Blue Sky Holidays Ltd., Blue Sky House, London Road, East Grinstead, West Sussex RH19 1HU<br><b>Blue Sky Holidays Ex Glasgow &amp; Edinburgh Tel : 041-248 2791</b><br>Blue Sky Holidays Ltd. Sovereign House, 65 Berkeley Street, Glasgow C3<br><b>Blue Cars Southbound Tel : 0342-27181 or 01-240 3611</b><br>Blue Cars - Southbound, Blue Sky House, London Road, East Grinstead, West Sussex RH19 1HU<br><b>Golden Lion Holidays - To Morocco, Las Palmas, Lanzarote, Cruising, Paris, Brussels &amp; Amsterdam - Tel : 0342-27477 or 01-240 3611</b><br>Golden Lion Holidays Ltd., Blue Sky House, London Road East Grinstead, West Sussex RH19 1HU<br><b>ADMINISTRATION</b> Blue Sky Ex Gatwick and Manchester. Golden Lion Holidays Blue Cars - Southbound<br>Tel: 01-240 3611 or East Grinstead (0342) 27127 Blue Sky Holidays Ex Glasgow & Edinburgh Tel: 041-248 2791 |             |   |  |  |                | <div style="border: 1px solid black; border-radius: 50%; width: 40px; height: 40px; display: flex; align-items: center; justify-content: center; margin: 0 auto;"> <span style="font-size: 24px;">1a</span> </div> |  | Agents Ref.:          |  |                   |             |       |  |            |                |               |  |  |  |
| <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">Departure Airport</th> <th style="width: 15%;">Resort/Tour</th> <th style="width: 15%;">Hotel</th> <th style="width: 15%;">State Hotel terms required<br/>Bed &amp; B'fast, Half board, Full board</th> <th style="width: 10%;">Holiday No</th> <th style="width: 10%;">Departure Date</th> <th style="width: 10%;">No. of Nights</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>  |             |   |  |  |                |  |  |                       |  | Departure Airport | Resort/Tour | Hotel | State Hotel terms required<br>Bed & B'fast, Half board, Full board | Holiday No | Departure Date | No. of Nights |  |  |  |
| Departure Airport  | Resort/Tour | Hotel   | State Hotel terms required<br>Bed & B'fast, Half board, Full board | Holiday No   | Departure Date | No. of Nights  |  |                       |  |                   |             |       |  |            |                |               |  |  |  |
|  |             |   |  |  |                |  |  |                       |  |                   |             |       |  |            |                |               |  |  |  |
| CABIN CAT  |             | DECK  |  | FOR OFFICE USE ONLY  |                | Batch No.<br>3   |  |                       |  |                   |             |       |  |            |                |               |  |  |  |
| ACCOMMODATION<br>State room  |             | Room Occupants<br>Surname in capitals please  |  |  |                |  |  |                       |  |                   |             |       |  |            |                |               |  |  |  |
| First Room - State type<br>(see abbreviations)   |             | Initials  |  | Mr./Mrs.<br>Miss<br>Master   |                | Age if under<br>18 on date<br>of departure   |  |                       |  |                   |             |       |  |            |                |               |  |  |  |
| <div style="border: 1px solid black; border-radius: 50%; width: 40px; height: 40px; display: flex; align-items: center; justify-content: center; margin: 0 auto;"> <span style="font-size: 24px;">2</span> </div>  |             | <div style="border: 1px solid black; border-radius: 50%; width: 40px; height: 40px; display: flex; align-items: center; justify-content: center; margin: 0 auto;"> <span style="font-size: 24px;">4</span> </div>   |  | Insurance<br>delete as<br>required   |                | YES/NO   |  |                       |  |                   |             |       |  |            |                |               |  |  |  |
|  |             |   |  | YES/NO   |                | YES/NO   |  |                       |  |                   |             |       |  |            |                |               |  |  |  |
| PB SH WB T WC  |             |   |  |  |                |  |  |                       |  |                   |             |       |  |            |                |               |  |  |  |
| Second Room - State type<br>(see abbreviations)  |             |   |  |  |                |  |  |                       |  |                   |             |       |  |            |                |               |  |  |  |
| PB SH WB T WC  |             |   |  |  |                |  |  |                       |  |                   |             |       |  |            |                |               |  |  |  |
| Third Room - State type<br>(see abbreviations)   |             |   |  |  |                |  |  |                       |  |                   |             |       |  |            |                |               |  |  |  |
| PB SH WB T WC  |             |   |  |  |                |  |  |                       |  |                   |             |       |  |            |                |               |  |  |  |
| Fourth Room - State type<br>(see abbreviations)  |             |   |  |  |                |  |  |                       |  |                   |             |       |  |            |                |               |  |  |  |
| PB SH WB T WC  |             |   |  |  |                |  |  |                       |  |                   |             |       |  |            |                |               |  |  |  |
| ABBREVIATIONS PB Private Bath T Terrace WC Toilet<br>SH Private Shower WB Wash Basin Only  |             |   |  |  |                |  |  |                       |  |                   |             |       |  |            |                |               |  |  |  |
| All correspondence to be sent to<br>Name _____<br>Address _____<br>City/Town _____<br>County/Postal Code _____<br>Telephone: Home _____<br>Telephone: Business _____<br>Deposits £12 per fare paying passenger (or applicable amount for cruises advised at time of booking) or full amount where travel is within eight weeks £ _____<br>Holiday insurance Premium as applicable per person £ _____<br>Enclosed cheque/postal order/cash for £ _____<br>On behalf of the persons listed above I agree to the holiday booking and insurance conditions set out within the Company's brochure as constituting an integral part of the contract entered into. <i>Signature of person making booking</i> _____ Date: _____<br><i>Signature of Parent or Guardian for bookings by persons under 18 years of age.</i> _____ Date: _____   |             | Blue Cars - Southbound<br>Joining tour at: _____<br>Leaving tour at: _____<br><b>DOMESTIC FLIGHTS</b><br>British Caledonian connecting flight required from:<br><div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 2px; font-size: 8px;">              Buy it with Access           </div> <input type="checkbox"/> <div style="border: 1px solid black; padding: 2px; font-size: 8px;">              BARCLAYCARD           </div> <input type="checkbox"/> <div style="border: 1px solid black; padding: 2px; font-size: 8px;">              VISA           </div> <input type="checkbox"/> </div> Payment of Deposit (or total holiday cost) by Barclaycard or Access. Please tick appropriate box<br>Cardholder's Account particulars<br>Surname & Initials _____<br>Number: _____<br>Amount to be charged _____<br>Cardholder's Signature _____ |  | Ch Reds % No _____<br>% No _____<br><b>No. Insurance</b><br><b>Holiday Insurance Premiums</b><br>Novaplan Special insurance cover for Blue Sky Holidays Golden Lion Holidays and Blue Cars Southbound has been arranged through leading insurance companies. Please see page 106 for an outline of cover provided. If making your own insurance arrangements, indicate NO in the box provided on this book or form, otherwise insurance will be automatically effected by us.<br>Blue Sky Holidays Ltd (ATOL No 1538D)<br>Blue Cars Southbound Ltd (ATOL 7338)<br>Golden Lion Holidays<br>Scotair Services Ltd (ATOL No 7348D)<br>are bonded tour operators. |                |  |  |                       |  |                   |             |       |  |            |                |               |  |  |  |
| <div style="border: 1px solid black; border-radius: 50%; width: 40px; height: 40px; display: flex; align-items: center; justify-content: center; margin: 0 auto;"> <span style="font-size: 24px;">1b</span> </div>   |             | <div style="border: 1px solid black; border-radius: 50%; width: 40px; height: 40px; display: flex; align-items: center; justify-content: center; margin: 0 auto;"> <span style="font-size: 24px;">1c</span> </div>  |  |  |                |  |  |                       |  |                   |             |       |  |            |                |               |  |  |  |

Figure 1 A typical form showing a variety of kinds of question.

# REPORT OF ROAD ACCIDENT

# VEHICLES INVOLVED

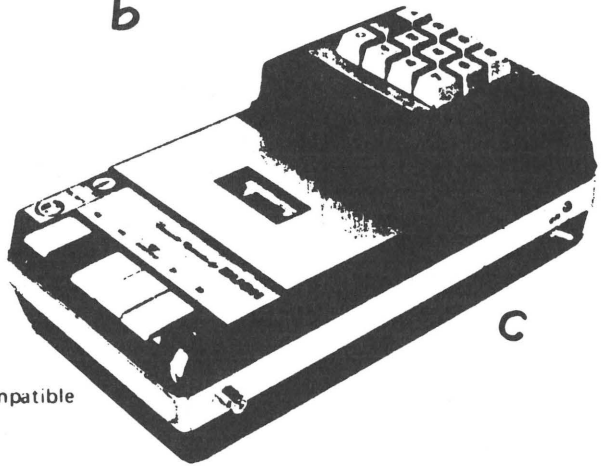
## ATTENDANT CIRCUMSTANCES

|   |   |                          |
|---|---|--------------------------|
| <b>JUNCTION DETAIL</b>                                  |   |                          |
| Roundabout  | 1 | <input type="checkbox"/> |
| 'T' or staggered junction                               | 2 |                          |
| 'Y' junction  | 3 |                          |
| Crossroads  | 4 |                          |
| Multiple junction                                       | 5 |                          |
| Other junction  | 6 |                          |
| Using private drive or entrance                         | 7 |                          |
| Not at or within 20 yards of junction                   | 8 |                          |
| <b>JUNCTION CONTROL</b>                                 |   |                          |
| Authorized person                                       | 1 | <input type="checkbox"/> |
| Automatic traffic signal                                | 2 |                          |
| Stop sign   | 3 |                          |
| 'GiveWay' sign or marking                               | 4 |                          |
| Uncontrolled  | 5 |                          |
| <b>PEDESTRIAN CROSSING</b><br>(If on or within 50 yds.) |   |                          |
| Manually controlled                                     | 1 | <input type="checkbox"/> |
| Light-controlled at junction                            | 2 |                          |
| Light-controlled not at junction                        | 3 |                          |
| Uncontrolled  | 4 |                          |

|                              |    |      |  |     |     |     |     |  |  |
|------------------------------|----|------|--|-----|-----|-----|-----|--|--|
| <b>REGISTRATION NUMBERS</b>  |    |      |  |     |     |     |     |  |  |
| 1st                          |    | 2nd  |  | 3rd |     | 4th |     |  |  |
| 3rd                          |    | 4th  |  | 1st | 2nd | 3rd | 4th |  |  |
|                              |    |      |  | 7   | 8   | 9   | 10  |  |  |
|                              |    |      |  | (7) |     |     | (7) |  |  |
| <b>TYPE</b>                  |    |      |  |     |     |     |     |  |  |
| 11-12                        |    |      |  |     |     |     |     |  |  |
| <b>MAKE</b>                  |    |      |  |     |     |     |     |  |  |
| <b>VEHICLE DEFECTS</b>       |    |      |  |     |     |     |     |  |  |
| Load                         | 12 | 15   |  |     |     |     |     |  |  |
| Tyres—report for process     | 11 | 12-0 |  |     |     |     |     |  |  |
| Brakes                       | 0  | 1-6  |  |     |     |     |     |  |  |
| Lights, front                | 1  | 16   |  |     |     |     |     |  |  |
| Lights, rear                 | 2  | 12-0 |  |     |     |     |     |  |  |
| Brake lights                 | 3  | 1-6  |  |     |     |     |     |  |  |
| Trafficators                 | 4  | 12-0 |  |     |     |     |     |  |  |
| Vision—glass wipers, washers | 5  | 1-6  |  |     |     |     |     |  |  |
| V.E. report requested        | 6  | 17   |  |     |     |     |     |  |  |
|                              |    | 12-0 |  |     |     |     |     |  |  |
|                              |    | 1-6  |  |     |     |     |     |  |  |

a

b



c

'Comquest'— a push-button computer-compatible questionnaire answering device

Figure 2 A form requiring coded answers to multiple choice questions. In (a) there is a single question/answer link; in (b) the same questions are asked of several items.

*Abstracts* has no entry under *forms*, at least not as such. If you found some research, could it be safely applied to the form you are revising? And if it could, would that be sufficient to ensure that your revised form would be adequate for its intended purpose? These are the sorts of issues that will be explored in greater detail in this paper. Such issues challenge the assumption tacitly accepted in many organisations that a clerk with certain high school grades must have the competence to design a form.

### 1.1 *The function of forms*

One of the difficulties inherent in the design of many forms is that they serve a variety of purposes. They elicit information from the form-filler; they transmit this information to some administrative processing system, or perhaps to several. For example, an invoice may have functions in both the accounts department and in the dispatching department, and perhaps in other sections of the organisation, too. Consequently there may be conflicting criteria which must be reconciled in the design of the form. The nature and severity of this conflict will vary with the specific form under consideration and with the specific organisation using the form. From the outset, therefore, it is evident that although some of the decisions about form design can be related to general guidelines that will be widely applicable, other decision which may be just as critical for the success of the form have to be taken with respect to local factors within the organisation itself. This sets the contrast which will be explored in the following discussion: the contrast between general objectives and specific decisions, between strategy and tactics in designing forms.

There may be many people concerned with different aspects of a form — its production, its distribution, its analysis, etc. But all forms have one common element. Somewhere there is a form-filler. For the most part the present discussion will concentrate on making things easier for the form-filler. The rationale for doing this is simple. If the data becomes inaccurate at the first stage of data completion, there may be relatively little point in proceeding to the other stages of data processing. However, this facet of the problem seems under-explored. There are a number of texts offering advice on data preparation for keypunch operators (e.g., Knox, 1965; Osteen, 1969), on printing techniques and on stock control (e.g., H.M.S.O., 1972), but relatively little advice exists on how to improve the form-filler's performance. There is some work on questionnaire design which can be related to

various aspects of forms (e.g., Moser and Kalton, 1971; Sinclair, 1975), but the kinds of questions found on questionnaires tend to overlap only partially with the kinds of questions to be found on forms. Questionnaires may require subjective estimates (Do you think academic journals are good value for money?). Because of this subjective element, many of the problems of questionnaires are associated with making sure that the answers are valid and reliable (Brigham, 1975). In contrast to the subjectivity of questionnaires, most forms require factual details (How many packets were delivered?). The answers to such questions are often cross-checked with other information such as how many packets were ordered, how many packets have been charged for on the invoice, etc. So although some of the work on questionnaire design will be equally applicable to forms (e.g., the discussion of typographic factors by Gray, 1975), forms also generate their own special problems.

### 1.2 *The cost effectiveness of good design*

It is not always easy to estimate the real costs of forms, particularly forms which serve functions in a variety of departments within an organisation. Nevertheless, it is possible to illustrate the magnitude of the potential savings which could come from improving the design of forms. In Britain the Civil Service Department has estimated the amount that forms cost the Government, or rather the tax payer. These estimates were published in 1975 in a management services handbook, *Forms Control*. In 1975 paper alone cost \$33 million. The administrative and labour costs were thought to be 20-25 times the cost of production. A rough figure of the costs for 1980 can be obtained by prorating these figures by 10% per annum. This figure of 10% is undoubtedly highly conservative. Not only has inflation been higher than this but the management services handbook reported that paper costs to Her Majesty's Stationery Office rose by 60% in the 18 months from April 1973. This extrapolation of the 1975 figures suggests that the 1980 cost of government forms will be at least \$265 million. Therefore, even a small improvement resulting in only a 1% increase in efficiency would save tax payers over \$2 million per annum. If the estimate that government forms are increasing at the rate of 400 per year is correct (Ryan, 1978) the savings may be much greater than this.

Nor should it be thought that the British are an exceptionally form-bound nation. Miller (1978) cites an Associated Press report that the United States government issues 9,800 different kinds of forms. Each

year more than 500 million of these forms are completed. Data on the error rates with some of these forms are not readily available, but the point to note is that even a 5% error rate, which in many organisations would be considered low, would mean that 25 million forms have mistakes on them. Dealing with such a large absolute number of errors can be expensive. If good design can reduce an error rate from 5% to 3%, this may sound trivial in percentage terms but it represents 10 million forms which do not have to be mailed back to the form-filler for correction and then re-processed when they are returned. It is the very large numbers in which forms are processed that is the strongest advocate for the cost effectiveness of good form design.

In addition to the more obvious financial benefits from improving forms, there are also less tangible effects. Removing some of the trivial frustrations that beset form-fillers, such as trying to provide an inch's worth of information in a half-inch space, will inevitably benefit the public image of the form-producing organisation. Alternatively it will benefit morale if the form is completed within the organisation. The number of bad examples available (Wright, 1975) suggests that this point is not fully appreciated in either the public or the private sectors.

## *2. Possible research strategies*

The general issues in form design can be thought of as falling into one of three categories: the language on the form, the overall structure of the form, and the substructures within the form such as the questions themselves (the notes, the kinds of answers permitted, etc.). The available research does not distribute itself evenly across these three categories. There is an increasingly cohesive body of research addressing the problems of comprehension (see, for example, the recent review by Clark and Clark, 1977). Much of this has been concerned with relatively short passages of text, but although there have been studies of the language of questions and answers very little of it has actually used the kinds of material found on forms. Research on the overall structure of the form hardly exists at all. Some of the more general problems of legibility have relevance, but many of the interesting options available in form design have not yet been explored. Of the various elements occurring within a form only a few of these have been studied in any systematic way. Before considering the studies of these elements in detail, it may be helpful to illustrate what sort of research information is available in the other categories, namely studies of language and studies of overall structure.

## 2.1 *The language of forms*

Some of the psycholinguistic work on comprehension has been abstracted and related to forms by Wright and Barnard (1975). For the most part such research seems to have confirmed rather than added to the many guides which have long been available on how to write clear English (e.g., Graves and Hodge, 1943; Gowers, 1954). Nevertheless, the existence of advice does not mean that people are aware of it. Such a research summary was felt to be sufficiently useful by the Department of the Environment that in 1975 they circulated a synopsis of the main conclusions to all local authorities in England. One of the problems of designing the language on forms is that ambiguities may arise from a variety of quite different casual factors. The precise meaning of a familiar word may easily vary between individuals. Words like *income*, *dependant*, or *family* may be interpreted in different ways in different circumstances. Similarly, the writer tends to be aware only of the intended meaning of a sentence or question. The form designer who asked, "When did you leave school?" when he meant to ask, "How old were you when you left school?" probably had little idea how many form-fillers would "misunderstand" the question (Meneer, 1975).

Recently Wright (1979,1980) has outlined several procedures which can be introduced into the design process to improve the adequacy and effectiveness of the language on documents. These procedures will be considered in more detail in the discussion of tactical issues in form design. For the moment we can note that guidelines are available, research summaries are available, and ancilliary procedures are available to the designer for ensuring that the language on forms is clear and easily understood. The problem of why, in spite of this, forms are often difficult to understand is a question to which we must return later.

## 2.2 *Overall structure*

A second general issue about form design relates to the overall structure of the form, the sequencing of the information, and the relations among the various elements of the form. One domain where this variation in overall structures is easy to observe is the application form included within most travel agents' brochures. The content is usually very similar to that shown in Figure 1. So, too, is the variety among the kinds of question included on the form. Nevertheless, there are a number of differences in the way the information is presented. Some-

times the path through the form is indicated by explicitly numbering the questions. Sometimes there is a colour-coded distinction between the white spaces provided for answers and the coloured spaces which surround the text. The form shown in Figure 1 has neither of these characteristics, although it was printed in three colours: yellow, blue, and black. For once, the differential costs of providing colour are not at issue. Most travel brochures use coloured displays. The issue concerns only the way in which colour is being used on the form. Does it matter? How important is the appearance of a form and what effects do differences in appearance have on the form's usability?

At the moment it seems almost impossible to answer such questions. There have been some interesting proposals concerning the overall structure of a form, but relatively little systematic empirical work has been undertaken. Pioneering studies in this area are the reports by Jones (1968) and Wason (1968) who explored ways of helping the form-filler to by-pass irrelevant questions. For example, the third question on the form might ask form-fillers if they were over 65. Those answering "Yes" were instructed to jump straight to question seven, whereas those answering "No" continued with question four. Although both Wason and Jones reported success with such jumping procedures, there remain a variety of graphic options for indicating the path to be taken. Recently in the United Kingdom the city of Liverpool has considered alternative graphic displays for presenting such sequences on a welfare benefit form. One of their options used arrows (Figure 3a); the other relied on words. One let the jump points occur freely on the page, whereas the other restricted the jumps to one per page and located the jump point in the same spatial position on each page (Figure 3b). This is undoubtedly an interesting innovation in forms design, and one that is increasingly relevant to computer-controlled question and answer dialogues. At the moment, however, no firm conclusions are available about such novel approaches. So only one further point will be made about their use.

Both Jones and Wason showed how sequences of jump questions could be depicted in graphic form as a flow chart. Although flowchart diagrams have not often been used in the final version of a printed form, their construction during the design stage may well provide the designer with useful insights into the consequences of sequencing the information on the form in various ways. It enables the designer to see where the interdependencies are, where there are groups of questions that would all be relevant to a particular category of form-filler. For

9 Did you move into your home after last April 1st? Put down 'yes' or 'no' .....

# Pay

10 Are you, or the people that you put down in box 1, self-employed?

Yes  No  go to 11

Put down how much net profit each self-employed person gets in an average week. Put down the name of each self-employed person on the left. Put down how much net profit he gets at the end of the line.

..... gets .....

..... gets .....

..... gets .....

When you send in this form, send in accounts with it to show the profits.

11 Do you, or the people that you put down in box 1, have a paid job?

Yes  No  go to 12

Put down the name of each person who has a job. Next to the name, put down the firm that he or she works for. And put down the address of each firm.

..... works for .....

For each person who has a job, you need to send in the last five pay-slips. If you cannot do this yet, send in the pay-slips when you can. If you do not wish to do this, ask the firms to fill in the pay chart that is at the end of this form.\*

12 Do the people in box 1 do more paid work than you have put down so far?

Yes  No  go to 13

Put down who does this work and how much they get from it, before tax.

..... gets ..... a week

..... gets ..... a week

# Dole and sick pay

13 Are you, or the people in box 1, off work and getting sick pay from a firm?

Yes  No  go to 14

Put down who gets this sick pay, and how much it is

..... gets ..... a week

..... gets ..... a week

\*The pay chart has been omitted from this draft form. It will contain the questions on the present "Certificate of Earnings" form.

# Pay

6 Does anybody in Box One do any sort of paid work, full-time or part-time?

Yes — go on to 7      No — go on to 9

7 Does anybody in Box One run their own business? If they don't, go on to 8. If they do, put down their names. When you send in this form, please also send in accounts for each person who runs his own business.

.....

.....

8 Does anybody in Box One have a paid job? If they don't, go on to 9. If they do, put down their names and their works numbers, and the names and addresses of their employers.

..... works for .....

at ..... and his works number is .....

..... works for .....

at ..... and her works number is .....

For each person who has a job, you must send in the last five pay slips.

# Dole, sick pay

9 Is anybody in Box One getting dole or sick pay from the State, or invalidity benefit, or sick pay from an employer?

Yes — go on to 10      No — go on to 12

10 Is anybody in Box One on the dole or getting sick pay from the State or getting invalidity benefit? If they are not, go on to 11. If they are, put down who gets this money and how much it is.

..... gets £..... a week.

..... gets £..... a week.

Please put down the address of the office which pays this money —

.....

11 Is anybody in Box One getting sick pay from an employer? If they are not, go on to 12. If they are, put down who gets this sick pay, and how much it is.

..... gets £..... a week.

..... gets £..... a week.

Figure 3 Alternative ways of presenting sequences of questions which involve jump instructions.

example, on welfare benefit forms the questions which apply to young parents may have no relevance to pensioners. Adequately dealing with this overall structure of the form is certainly a major issue. Where should the notes be placed? What is the best location for the declaration and signature? Unfortunately, at the moment there are few researchers dealing with such issues.

Perhaps the only sizeable body of research data which relates to the overall composition of a form are studies of graphic options, such as those concerned with the legibility of print. Summaries of such studies exist in a number of places (e.g., Tinker, 1965; Spencer, 1969). These summaries provide useful guidelines on the desirability of using print sizes having between 8- and 12-point *x* height, the desirability of using upright rather than italic fonts, the desirability of using mixed upper- and lower-case text rather than having text printed entirely in capitals (Poulton, 1967, 1968), the desirability of using colour in particular ways and with specified contrast levels between print and background (usually a minimum contrast level of 60% is recommended — Poulton, 1969), the desirability of using unjustified setting which gives an equal spacing between words rather than justification of lines with variable spacing (Gregory and Poulton, 1970).

The whole issue of the way in which white space can be used to help the reader grasp the structure of a document is an interesting one which has been discussed by Hartley (1978). Although Hartley was mainly concerned with the design of instructional texts, his illustrations of how an “invisible” grid can provide coherence in the use of space may well be equally relevant in the design of forms.

A discussion of factors which might motivate a decision to use a single column array rather than dividing each page into two columns can be found in Hartley, Burnhill, and Fraser (1974) and Whalley and Fleming (1975). In both places the recommendation is to allow a single line of text to fill the width of the page. Tinker (1965) points out that greater inter-line spacing helps line lengths to be increased without loss of legibility. But none of these studies have been carried out with forms. It is not obvious that textual displays which help the reader deal with paragraphs of prose will be equally helpful in answering short yes/no questions. A double column which allows notes to be alongside questions may in some instances be much more useful to the form-filler than relegating all the notes to the back page. Similarly the decision to allocate one line per question sometimes results in large gaps between the text of the questions printed on the left

hand side of the page and the answer spaces provided on the right hand side of the page. The literature on graphic communication has relevance to many of the problems which arise when designing forms, but there are times when the available research seems not to have been taken far enough to meet more specific problems of form design.

### 2.3 *The elements within forms*

Although there are higher-order issues about the selection of a particular kind of question in the first place, it is also feasible to consider the various kinds of question found on forms in their own right. One can address research to issues concerning the language, layout, or response constraints of these different kinds of questions. Of course, such an approach has its hazards. Conclusions based on experimental studies where only one kind of question is examined may need qualification when generalizations are made to performance on a form consisting of a variety of different classes of question. Indeed important carry-over effects have been found operating even within a given class of question such as yes/no questions. Those who have filled in an application form for renewing a British driving license may remember that they were asked if they could read a number plate at 25 yards. If you wanted a licence you had to say "Yes," but the question followed other medical questions to which the answer had been "No." This context of responding "No, No, No," led many applicants to say their vision was defective. The question itself was not difficult to answer, but its location on the form produced response errors. These errors dropped considerably when the form was redesigned so that the question about eyesight was separated from the other health questions.

This example illustrates that research which focuses on the individual elements within a form may need to be applied with care in the design of a specific form. Nevertheless, there are a considerable number of components within a form, such as the instructions to the form-filler, the explanatory notes, the various kinds of questions, and the constraints which may be imposed on the way the questions are answered. Without some empirical evidence which can help to narrow the range of options for consideration by the designer, there would seem to be just too many possible combinations of factors for it to be clear even where one might start when designing a form. The next section reviews some of the research that has explored performance with various kinds of question, and in particular examines the effects of the way answers are recorded by the form-filler.

### 3. *Performance with various classes of question*

Figure 4 outlines a simple taxonomy of the various classes of question which can occur on forms. For each kind of question, Figure 4 indicates some of the ways in which the answers may be recorded by the form-filler. Recently some new data has become available which indicates how critical this factor of recording the answer can be (Wright, Aldrich, and Wilcox, 1977). Form-fillers may understand the question, know the answer, but still make mistakes if they are asked, instructed, or constrained to respond in certain ways. This provides the motivation for examining the effects of response constraints on a variety of questions.

#### 3.1 *Free response questions*

In recent years there has been an increasing tendency to ask form-fillers to write answers in spaces that are segmented in such a way that a uniform area is allocated to each letter. Figure 5 illustrates one example of such a spatial arrangement. There are a number of variations on this theme. It is sometimes thought that constraining the way people write by use of such character separators will increase the legibility of what is written. Research by Barnard and Wright (1976) has shown that this is not the case. They had people copy lists of names into the three types of response box shown in Figure 6. They

*Figure 4* Simple taxonomy of the response options within the various classes of questions found on forms.

| <i>Classes of question</i> | <i>Some of the responses which may be made by form-fillers</i>   |
|----------------------------|--|
| <i>Yes/No</i>              | writing YES or NO in full<br>ticking a box<br>circling one of the options<br>deleting one of the options   |
| <i>Free response</i>       | writing in empty space<br>writing on horizontal lines<br>writing numerical information within columns<br>writing alphanumerics in character separated spaces |
| <i>Multiple choice</i>     | marking the answer selected (e.g., tick or circle)<br>writing the code number of the answer<br>deleting answers not selected                                 |
| <i>Sentence frame</i>      | filling in gaps<br>selecting from alternatives given   |
| <i>Matrix</i>              | ticking cells<br>writing verbal information<br>writing numerical information<br>writing code letters or numbers  |



Many questions can be raised about the generality of these findings. Are they critically dependent on the physical dimension of the boxes? Would things be different if the boxes were in colour? We do not know the answer to such questions. But until such time as we do, it is obviously safest to proceed with caution. It seems certain that some of the problems which form-fillers encounter would not change with minor variations in the display. For example, people often had difficulties correcting any mistakes made when writing in character segmented spaces. If a word has been misspelt or a letter omitted, it is far from clear how such a mistake can be rectified. When writing on open tramlines people simply cross out the word and write it again or use caret marks to indicate missing letters. Form-fillers who tried rewriting words within the segmented formats found that they ran out of spaces. This led some of them to start writing two letters in a single box while others decided it was simplest to overflow into the margins. Such problems are likely to be more numerous with forms completed by the general public than with forms completed by specialised target

Figure 7 Summary of the relative legibility of answers written in the three kinds of answer space.

**In the same time to read:**

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Q | U | E | S | T | I | O | N | : | H | O | W | T | O | S | A | V | E |   |
| T | I | M | E | , | R | E | D | U | C | E | M | I | S | T | A | K | E | S |
| C | U | T | C | O | S | T | S | A | N | D | A | V | X | X | X | X | X |   |
| X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |   |
| X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |   |

**You could have read:**

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Q | U | E | S | T | I | O | N | : | H | O | W | T | O | S | A | V | E |   |
| T | I | M | E | , | R | E | D | U | C | E | M | I | S | T | A | K | E | S |
| C | U | T | C | O | S | T | S | A | N | D | A | V | O | I | D |   |   |   |
| F | R | U | S | T | R | A | T | I | O | N | ? | A | N | S | X | X | X | X |
| X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |

**Or you would have had time to read:**

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Q | U | E | S | T | I | O | N | : | H | O | W | T | O | S | A | V | E |   |
| T | I | M | E | , | R | E | D | U | C | E | M | I | S | T | A | K | E | S |
| C | U | T | C | O | S | T | S | A | N | D | A | V | O | I | D |   |   |   |
| F | R | U | S | T | R | A | T | I | O | N | ? | A | N | S | W | E | R | : |
| D | E | S | I | G | N | B | E | T | T | E | R | F | O | R | M | S |   |   |

populations who can perhaps be trained in error-correction procedures. But why not relax the response constraints and use a simpler answer procedure? The decision about what information to include or leave out from a field of predetermined length, is a buck that cannot safely be passed from the system analyst to the man in the street.

To summarize the findings of Barnard and Wright: the assumption that such response constraints will slow writers down appears to be true, the assumption that slowing writers down makes their writing more legible appears to be false. So if the people in the computer section are insisting that they need answers written in character segmented spaces, ask them for evidence that this is not going to make life harder for the operator in the data processing section who has to read and key-in the information which has been provided as an answer. The available research suggests that the use of character separators could easily slow things down by as much as 16%. This implies that seven hours work by a data processor working on forms without separators would take eight hours if separators had been included on the form. Poor form design can be expensive.

### 3.2 *Yes/no questions*

Response constraints are an important factor not only in answering open-ended questions but also in multiple choice and yes/no questions. On the travel agents' form shown in Figure 1 the form-filler was asked to respond to yes/no questions by deleting what did not apply. Psycholinguistic studies have shown that negative elements can be a source of difficulty in understanding statements (Wason, 1965) or following instructions (Jones, 1966). Barnard, Wright, and Wilcox (1979) examined performance with such negative instructions when filling in a form. They contrasted negative instructions such as *delete* with affirmative instructions to respond by circling or underlining the word that did apply. They found that for both yes/no questions (Are you married?) and for questions that had alternatives given in a sentence frame (I am single/married) performance was better when people were given affirmative instructions rather than negative instructions. These results are summarized in Figure 8. Barnard et al. went on to show that administrators checking the form for mistakes also found it easier when the form-filler had been given affirmative instructions. The implications for form-design seem very straightforward. Allow people to select the items that apply to them.

Another issue that can be raised about the response to yes/no questions concerns where the question should be located on the page in relation to the yes/no options. When the response is made by putting a tick in a box, it is possible to consider the use of electronic sensing devices to read the data directly into the computer. However, one constraint that often accompanies the use of such sensing devices is that the boxes may need to be aligned vertically so that the answers can be easily scanned by the electronic reader. In an ongoing study, Philip Barnard and I have been comparing some alternative ways of spatially relating yes/no answer boxes to questions. So far we have data from two rather different measures. We have the time taken to complete a particular version of the form. We also have people's guesstimates of how long the different versions will take. The data available so far are summarized in Figure 9, where these two measures have been prorated to a common base line for ease of comparison.

Figure 8 The relatively slower performance when deleting the answer that does not apply, shown for three kinds of question.

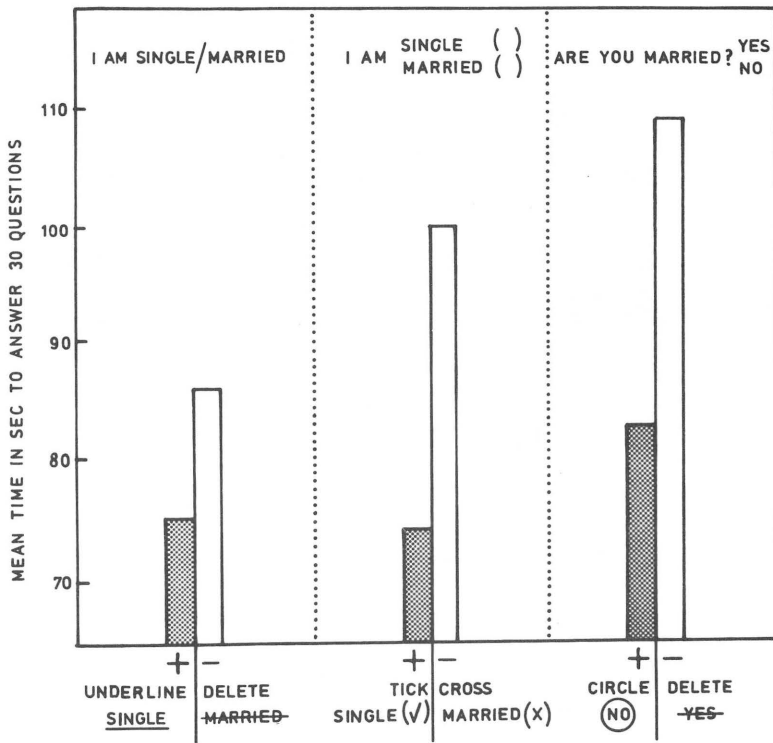
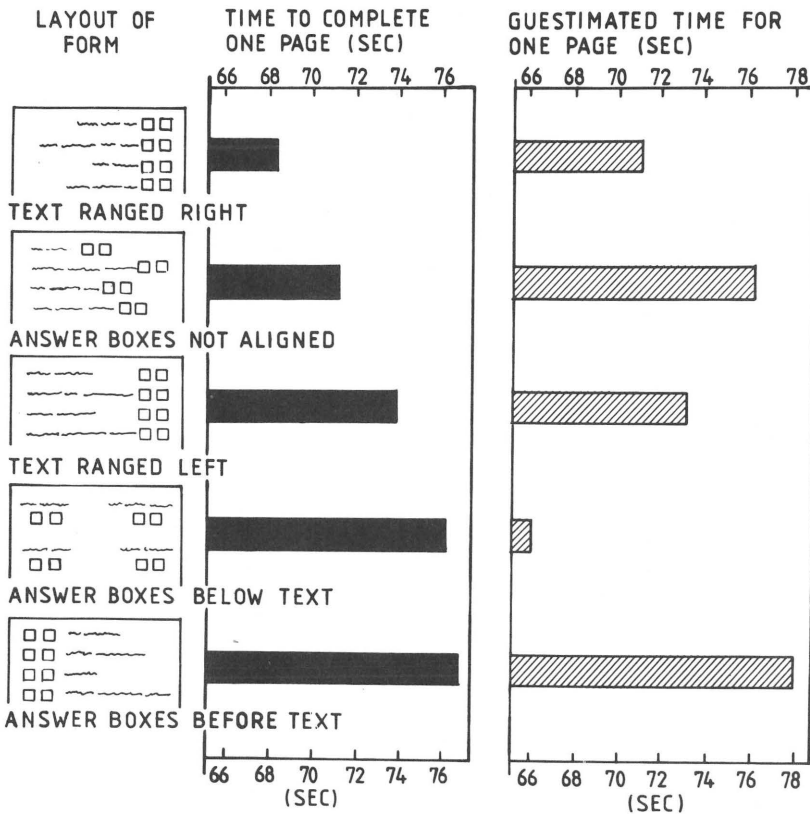


Figure 9 suggests that one of the critical factors in determining the actual time to complete the form was the distance between the end of the question and the yes/no answer boxes. Where this distance was short the form was completed faster. However, people's guesstimates suggest a rather different picture. There was a clear preference among people for the double column layout where the boxes were located underneath each question. When the response boxes followed the question mark immediately, with no attempt to vertically align the answers, the page appeared more cluttered than did some of the alternatives. This may be one reason why people guesstimated that this layout would be fairly slow to complete, although it was in fact among the fastest on the performance measures.

At the moment it is not clear why there is this mismatch between people's performance and their preferences. Nevertheless, in the context of form design it is important to consider what the consequences

Figure 9 The actual time taken to answer 24 yes/no questions varies with the page layout. People's guesses about relative completion times show a different rank ordering.



might be of people thinking that the form is going to be more difficult to complete, just on the basis of the appearance of it. Does this increase the likelihood of them putting it behind the clock and waiting until they receive a reminder from the organisation concerned? Gray (1975) has emphasized the part that typographic factors may play in motivating a form-filler. So although in some contexts it may be appropriate to consider that subjective judgments are an unreliable index of performance, and an index which is particularly prone to experimental artifacts (Poulton, 1976), nevertheless it is possible that in the present instance these two measures capture two different facets of the form-filler's performance. Obviously information about another important aspect of the form can be obtained by considering what effect these different spatial arrangements have on the performance of the clerical staff who process the completed form. The different facets are being emphasized here in order to urge caution in basing recommendations for the design of forms on the results of single experiments. Forms are complex multi-user documents and raise researchable design questions across a very broad front. The integration of the available research information has then to be undertaken in relation to the nexus of user requirements for a specific form.

### 3.3 *Multiple-choice questions*

The previous section considered performance on questions having binary response options. Multiple-choice questions often involve a larger range of options. Sometimes the form-filler is asked to indicate his selection by ticking or deleting among the options. On other occasions the form-filler may be instructed to code the answers in some way.

Research indicates that care needs to be taken in devising such codes. A study by Wright, Aldrich, and Wilcox (1977) showed that coding systems could lead to an increased error rate among less able respondents. This increase was not caused by difficulty in using the coding system as such. These people made few errors when using the code to answer simple questions such as, "Which of the following are trees? pebble, oak, stick, cedar, willow." Nor did these people have great difficulty answering more complicated questions such as, "Which of the following countries is south of the equator and begins and ends with the same letter?" At least they had no difficulty as long as they were able to respond by using a simple ticking and crossing system. The errors arose when the more complicated response proce-

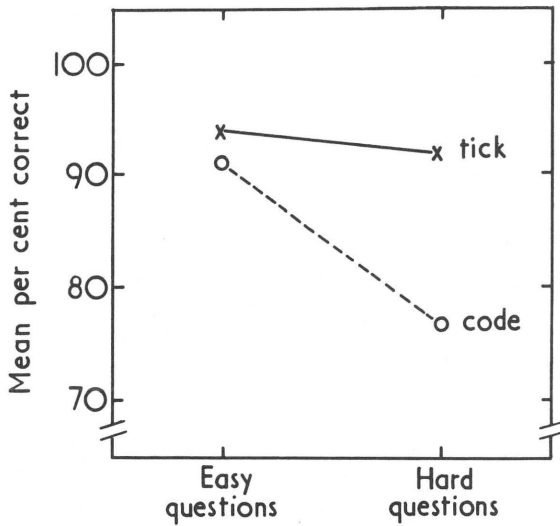


Figure 10 The effects of recording answers via a difficult coding system show up as the questions become harder.

ture of using a coding system was paired with the more difficult questions. A summary of some of the findings from this study is given in Figure 10 which shows that accuracy dropped by 15% — these are errors which could have been avoided by giving people a simpler method of recording their answers.

The coding system in the Wright et al. study was undoubtedly a complicated one to use. It had been based on the system being used by the University of London Examination Board, whereby candidates enter their answers on a card which is suitable for an optical mark reader. Nevertheless, similar findings have been obtained with much simpler coding schemes. For example, Wright and Barnard (1978) asked people to write down a mnemonically related code letter if an item had a particular attribute (e.g., write C if communist). This was again compared with instructions which asked the form-filler to tick if the attribute was present. Performance was better with the simple ticking response than with the code. So the accuracy of the data collected on a form is clearly not just a question of the language used in the question, nor the layout of the information on the page. Some of the difficulties that form-fillers have will arise from the way they are constrained to respond. The fewer these response constraints and the simpler the response to be made, the greater the accuracy of the data collected.

## Particulars of your household

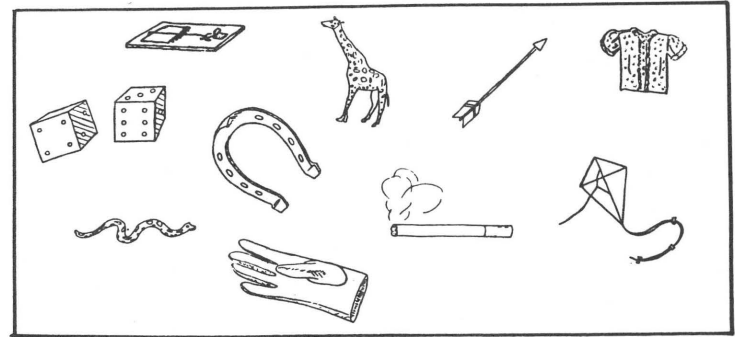
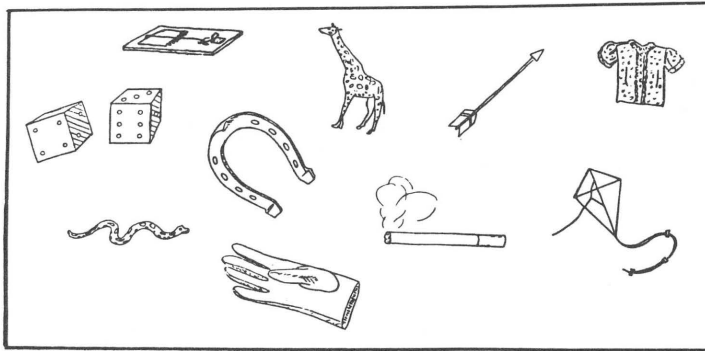
| 4 Full name of each person living with you—non-dependants should be included only if you are the householder (see note C). BLOCK CAPITALS PLEASE—<br><i>first names followed by surname</i> | See Section 5 below | State relationship to you or write "No relation" | Date of birth if under 21 | Give name of school if attending. Write D if dependant (see note D), P if of pensionable age (see note E), SB if receiving supplementary benefit |
|---|---------------------|--|---------------------------|--|
|   |                     |  |                           |  |
|   |                     |  |                           |  |
|   |                     |  |                           |  |
|   |                     |  |                           |  |

5 Please write the following letters where they apply in the space after the names of the members of your household above: *B* if registered as blind; *H* if registered handicapped person; and *E* if an expectant mother.

Figure 11 A common use of a matrix array to ask for information about members of the household.

### 3.4 Matrix questions

Wright and Barnard (1978) also examined alternative arrangements of questions presented in rectangular configurations, where information from row and column headings must be combined. Typically questions in the column headings of a matrix apply to the items listed on the left hand side of each row of the matrix (Figure 11). The example shown in Figure 11 has a number of different elements. Not only does it require a coded response, it also requires the form-filler to remember six different codes and their meanings. Understanding the questions involves referring to information given in notes elsewhere on the form. Wright and Barnard examined the effects of some of these factors. They devised an experimental procedure in which the members of a household were replaced by the items shown in a picture at the top of the form (Figure 12a and 12b). This enabled the experimenters to monitor how accurately the questions were being answered. They found that with their closest simulations of the genuine question they had a 25% error rate. Modifying the presentation so that each question had a separate column for the response (Figure 12b) reduced the errors to 13%. No further improvement in performance came from incorporating the notes directly into the question instead of printing them at the foot of the page, but the error rate fell to 8% when the row and column information was interchanged (Figure 13).



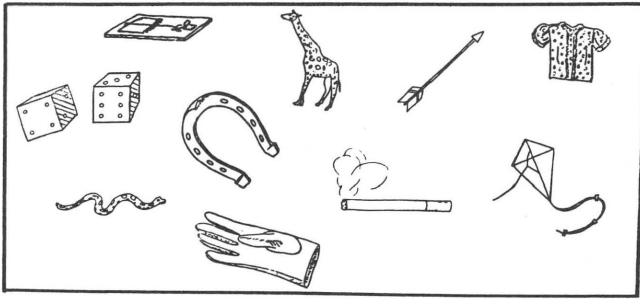
|                               |   |
|-------------------------------|---|
| Name of each item shown above | Write J if living in jungle (note A). Write R if recreational (note B). Write W if worn (note C). Write S if spotted (note D). Write M if metallic (note E). Write D if dangerous (note F). |
|                               |   |
|                               |   |

|                                |                                       |
|--------------------------------|---------------------------------------|
| Name of each item shown above  | Write J if living in jungle (note A). |
|                                | Write R if recreational (note B).     |
|                                | Write W if worn (note C).             |
|                                | Write S if spotted (note D).          |
|                                | Write M if metallic (note E).         |
| Write D if dangerous (note F). |                                       |
|                                |                                       |

- A Include wild animals living at the edges of jungles, as well as those living deep in the jungle.
- B Exclude anything that might be used for work (e. g., woodwork is both a hobby and a job).
- C Include items worn either by man or animal.
- D The term spotted is used here to include a wide range of patterning; i. e., anything that usually has spots or blotches, or anything shown as having them in the picture above.
- E Include items even if only a small part of the item is metal.
- F Dangerous means likely to cause injury unless care is taken.

- A Include wild animals living at the edges of jungles, as well as those living deep in the jungle.
- B Exclude anything that might be used for work (e. g., woodwork is both a hobby and a job).
- C Include items worn either by man or animal.
- D The term spotted is used here to include a wide range of patterning; i. e., anything that usually has spots or blotches, or anything shown as having them in the picture above.
- E Include items even if only a small part of the item is metal.
- F Dangerous means likely to cause injury unless care is taken.

Figure 12 (a) An experimental simulation of the form illustrated in Figure 11. (b) An alternative way of presenting the same questions.



|  |  |  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|--|--|
| Name of each item shown above  |  |  |  |  |  |  |  |  |  |
| Write J if found in jungle. Include wild animals living at the edges of jungles, as well as those living deep in the jungle.   |  |  |  |  |  |  |  |  |  |
| Write R if recreational. Exclude anything that might be used for work (e. g., woodwork is both a hobby and a job).   |  |  |  |  |  |  |  |  |  |
| Write W if worn. Include items worn either by man or animal.   |  |  |  |  |  |  |  |  |  |
| Write S if spotted. The term spotted is used here to include a wide range of patterning; i. e., anything that usually has spots or blotches or anything shown as having them in the picture above. |  |  |  |  |  |  |  |  |  |
| Write M if metallic. Include items even if only a small part of the item is metal.   |  |  |  |  |  |  |  |  |  |
| Write D if dangerous. Dangerous means likely to cause injury unless care is taken.   |  |  |  |  |  |  |  |  |  |

Figure 13 The effect of interchanging the row and column information of Figure 12b.

Figure 14 Summary of studies carried out on the effects of response constraints for various kinds of question.

| Question style  | Form-filler's response |      |     |        |         |
|-----------------|------------------------|------|-----|--------|---------|
|                 | Verbal                 | Mark |     | Code   |         |
|                 |                        | +ve  | -ve | simple | complex |
| Free response   | a,b,c                  | —    | —   | —      | —       |
| Yes/No          |                        | d    | d   |        | ?       |
| Multiple choice | —                      | d,e  | d   |        | f       |
| Matrix          |                        | g    |     | g      |         |
| Sentence frame  |                        | d    | d   |        |         |

- (a) Barnard and Wright, 1976
- (b) Barnard, Wright and Wilcox, 1978
- (c) Wing, 1979
- (d) Barnard, Wright and Wilcox, 1979

- (e) Hartley, Davis and Burnhill, 1977
- (f) Wright, Aldrich and Wilcox, 1977
- (g) Wright and Barnard, 1978

The authors suggest that the reason why it was beneficial to interchange the row and column information was because most people worked along each row in turn, no matter whether the questions were in columns or rows. The advantage of having the questions in the rows was that the precise meaning of the question could be worked out just once and then applied to each item in the column headings. With the more conventional arrangements, people may have forgotten the precise meaning of the first question by the time they returned to it on the second row. Nevertheless, they may have felt that the question was sufficiently familiar for them not to bother reading the notes again. Consequently errors were made.

Undoubtedly questions can be raised about the validity of these experiments. Whether such questions generate a 25% error rate when they occur on real-life forms is not known. But for our present purposes it is sufficient to note that two-thirds of the errors could be eliminated just by physically re-arranging the information. Again the emphasis is not simply on the fact that people make mistakes when filling in forms. The important point is that the frequency of these mistakes can be reduced by improvements to the design of the form. Such improvements would certainly be cost-effective. They would also be likely to have a beneficial effect on the public image of the body issuing the form.

### 3.5 *Further research*

If an organisation were to consider funding a large scale research program relating to the design of forms, would it be appropriate to plan more research of the kind summarised above? Certainly it is possible to draw up a simple taxonomy of the classes of question to be found on forms. Figure 14 does just this. It illustrates those cells which have been considered in research studies and highlights where further information is needed to fill in the empty cells.

But is the information of Figure 14 all that the form designer really needs? Perhaps a similar taxonomy could be devised for the notes on a form and also the language of the question. But what about the motivational impact of the look of the form? Can such matters be dealt with as general issues or will there be interactions with the specific content on a form? The next section considers some of the problems in form design that require specific rather than general solutions.

#### 4. *The inadequacy of some cook-books for form design*

The findings from research on response factors, which have been outlined in the previous section, could be summarized in a list or in a table such as that of Figure 14. One might imagine that eventually a collection of such summaries could be compiled and that this could provide something analogous to a cook-book of recipes for form designers. For example, there might be a table that assisted in selecting among different kinds of questions. Once this choice had been made there might be other tables dealing with factors relating to the language, layout, and response constraints for this kind of question. Certainly some systematisation of research on forms would be useful, but in itself this is probably not sufficient to ensure that forms are trouble-free. There are at least two reasons for doubting that any cook-books could ever be fully adequate. One of these reasons concerns the nature of the information available in the literature. The other concerns additional information that designers need which will never be available from the literature. Let us consider each of these reasons in turn.

##### 4.1 *The research literature needs interpretation*

One of the problems facing the designer of a form when he consults the research literature is that the studies reported will differ in a number of ways from the specific communication problem to hand. For example, the people taking part in the experimental study, often undergraduates, may not be typical of the people who will be completing the form. Similarly there may be important differences in the kinds of written information used in experiments (where materials are often designed to enable various factors to be kept under the control of the experimenter) and the kinds of written information found on forms. Even the reading purposes of the people taking part in experiments may be critically different from the way form-fillers read forms. In laboratory experiments the reader is often trying to remember what he reads so that it can be recalled later, or so that questions can be answered, or inferences drawn. In contrast, much of the information on forms is responded to immediately, either because it is an instruction that must be followed (*Write answers in black ink*) or is a direct question (*Are you self employed?*) So the designer needs to exercise caution when applying research findings. It will not necessarily be the case that because version X was better than version Y in the laboratory, the same will be true on a particular form.

Indeed, apart from the obvious differences that there may be between the experimental and the practical tasks, there is one other factor which emphasizes the role of the designer as interpreter. Even where there appears to be a consensus among the research findings, almost all the general principles which emerge will have exceptions. Welford (1978) has suggested that it is of more practical use to have a simple rule which is approximately true than to have a complicated rule which is precisely true. If this is the case then an appreciation of when exceptions are likely to occur is also necessary. In the guidelines they proposed, based on psycholinguistic research, Wright and Barnard (1975) tried illustrating some of the exceptions to the rules of thumb they were proposing. There are times when negatives and passives are the most appropriate way of expressing an idea. The guidelines draw attention to the possibility that the writer is using difficult sentence constructions outside this area of appropriateness.

A quite different reason why the research literature needs interpretation is that the experimental findings must be integrated with decisions about the cost effectiveness of various design options. This may mean choosing an option that was not the best in the performance task, if that option requires more paper or a more expensive printing process. The performance differences themselves are likely to have been expressed either in speed or in errors. These may each have a very different impact on the design decision depending on what kind of form it is, the way in which it will be processed, etc. One important point must be borne in mind when considering the cost implications of performance differences reported in the research literature. Differences found in the laboratory may be multiplied in practical situations. This can happen because of the very large numbers in which forms are processed. Consider, for example, the difference in time taken to answer a yes/no question affirmatively (circling what does apply) rather than negatively (deleting what does not apply). The difference was roughly one second per question in the data reported earlier. This may appear to be a trivial difference, given the time taken to fill in a form. Indeed if there is only one yes/no question on the form then it probably is a difference of no practical consequence. But when a form contains many such questions and when the form is being completed within an organisation where time costs money (rather than at home where the form-filler's time may appear to be more expendable), then the difference of 31% in the time taken for the two kinds of response may be fairly expensive. If a 50-item form is com-

pleted frequently (say, once a week) and is completed by many employees (say, 500), then the loss of 1 second per item becomes a loss of 361 man-hours per year, or nearly ten man-weeks. The performance differences in the research literature appear small because of the units of measurement used in experimental studies. It is for the designer to estimate the practical significance of these differences in the light of other information about how the form will be used.

One further point to be borne in mind when design decisions are made in favour of suboptimal versions is that although a single suboptimal factor on its own may not be critical, a number of them together may be disastrous (see the discussion by Reynolds, 1978). This was evident in the earlier discussion of the effects of using a complicated coding procedure for recording answers. The coding procedure had only a slight effect on accuracy when the questions were easy, but a much bigger effect when the questions were difficult. Similarly the effects observed in the laboratory may appear small because of the high motivation of the people taking part in the experiment and because the "working conditions" are relatively free from distractions. The difficulty of using the harder version may be considerably increased if the working conditions deteriorate. Wright and Fox (1972) compared performance with numerical conversion tables in a quiet, clerical task and in a simulated shopping task where goods had to be located, evaluated, and collected. The relative differences among the tables were the same in both tasks but the absolute magnitude of the difference was much greater in the shopping task.

One final point to be considered is that the consequences of errors on forms may sometimes be far-reaching. If the error on the form is spotted during some subsequent data-processing stage, then this may simply entail the inconvenience and cost of returning the form to the form-filler for correction. Yet the hidden costs of errors that go undetected may be more serious. For example, much government forecasting is done on the basis of information received through forms. This is a fact which leads many small businesses to protest (Carvel, 1978). If the raw data is inaccurate, there is no reason for being optimistic about the forecasts themselves. Nor does there seem to be any reason for assuming that errors in form-filling will be random. Indeed the evidence presented earlier has shown that the design of a form systematically influences the way people deal with it. Consequently, most people will tend to make the same sorts of mistakes. On occasion, form-fillers may even take concerted decisions about which "mis-

takes" to make when they are having difficulties selecting among the options provided on a form. By way of a cautionary tale, the author was told by some form-fillers that when dealing with a particular Home Office form their favourite "don't know" category was one particular item in the set of multiple alternatives provided for that question. The form served as an input for Government statistics. When the national press reported that there was an increase in the occurrence of this particular item it seemed a fair guess that this could just have been an increase in the form-filler's uncertainties. So why not include a "don't know" item among the alternatives available? This was suggested to one senior official within the organisation. The response to this suggestion was along the lines of, "Our people are trained to discriminate among these alternatives. There is no need for a 'don't know' category." As in many other areas of design there is an appeal made to training the form-filler as a substitute for designing an easily completed form. All ergonomists and human factors researchers will recognise the argument.

In summary, one of the reasons why a cook-book of research *findings* is inadequate for the designer is because details of the materials and procedure of the experiment are vital to an intelligent interpretation of the results. Another reason is that there are a number of financial implications attached to whatever decision the designer makes. A meaningful evaluation of the costs requires information about how the form will be used, by what kinds of people, in what sorts of environments, etc. This takes us to the second reason why this cook-book approach is inadequate. The designer will need some information that could never be included in a cook-book.

#### 4.2 *Design decisions about content and pretesting*

There are at least three separable classes of information that designers may need. These relate to the text, the reader, and the multiple functions that the form may serve. The problems of the text are partly problems of content. That is to say, there are issues about whether the question should be there at all. Legg and Brion (1976) carried out a survey of local government forms. They found that forms often contained questions relating to outdated legislation. This means that some local authorities were continuing to ask questions to which they no longer wanted to know the answer. A related constraint on the content of a form is whether the data can be meaningfully analysed (Brigham, 1975). Sometimes the temptation is to attempt too fine a

level of data collection, with the consequence that the analyst is overwhelmed by data. The computer will have no trouble with a 500 x 500 matrix, but whoever is trying to interpret the data may have trouble seeing the woods for the trees. So someone within any form-producing organisation should be asking, "Is your question really necessary?" Even assuming that it is, there is still need to consider whether a form is the best way of getting an answer. For some kinds of information a telephone call may be much quicker, or a personal visit may be much more informative.

The designer's problems with the text are only partly problems of deciding on the content. There are also problems of ambiguities which may be lurking in that content. We have already mentioned that it can be very difficult for a writer to appreciate that the words on a page may have a meaning which differs from that he intended. In recognition of this, the Department of the Environment sent a circular letter to all local authorities advising them to pilot their forms with consumers (Woof, 1976). The Department of Health and Social Security might have found such advice useful when they tried evaluating a new benefit scheme using a form which contained the instruction "Complete section B if you are claiming free school meals." Some form-fillers thought this meant if they were already receiving free school meals; others thought it meant if they were using the form to claim free school meals. So it was a mixture of people who chose to fill in section B. A similar ambiguity arose in two other places on the form.

Some kinds of "pretesting" can be carried out before the text of the form is ever drafted. The designer needs certain information about the form-fillers; for example, about how well they understand particular terms. Administrators may have a well established idea of the difference between a rent allowance and a rent rebate, but this distinction is probably lost on most of the general public. The form-filler's conceptual structures may also be important, the way they conceive things as being related or unrelated. An example of this can be found in a study by Barnard, Morton, Long, and Ottley (1977). They found that people located information in a list more easily when the sub-groupings in the list reflect semantic categories (e.g., fish, flowers, fruit, as separate groupings) rather than when there was a single alphabetic listing of all the items. By extension, the designer who has to make decisions about the grouping of items on a form might find it helpful to know, say, whether sources of income such as rent from

lodgers are more easily remembered when answering questions about household details than when answering questions about "income."

The importance of the reader's preconceptions is not confined to issues of content. People also have presuppositions about the way information is presented. One striking illustration of this occurred in December 1977 when an academic journal decided to change the way it presented the information in a summary table of books that had been reviewed during the year. The table consisted of three columns headed Title, Author, and Reviewer. The innovation consisted of alphabeticising the information within each column. Code letters followed each entry in the table to guide the reader from title to author or reviewer, since these were no longer all on the same line. The table was prefaced with a key explaining the new organisation and the use of the codes. Some informal observations of readers using the table showed that they ignored both the explanatory key and the code. They were happy to assume that they knew how such a table was organised. They assumed quite mistakenly that the information on a single horizontal row was related. In an experimental study of this table a group of readers were persuaded to spend time reading the key and deciding how the table was organised before they used it (Wright and Threlfall, 1980). In spite of studying the instructions there were many mistakes made. People sometimes forgot the explanation they had read and reverted to their expectations about how the information would be arranged. Probably many similar instances occur with forms, where people make mistakes not because the instructions are unclear but because the reader is expecting to be told to do something else.

At a more general level any details about the audience for a form will be useful to the designer. Different design decisions may be appropriate if the form is being prepared for a professional group who have their own conventions about jargon and format, than will be appropriate if the form is being designed for completion by people who have received little education, or who have no specific knowledge of the subject matter of the form. Such details about a form's readership will not be found in the sort of cook-book outlined above.

A third category of additional information that the designer will need is information about the way the form is used. This includes knowing the circumstances in which it is completed. If, in an industrial context, the form is filled in by a checker walking around the plant with a clipboard, the designer needs to know this because it has implications for the physical size of the form; it has implications for

the response to be made — the form-filler may find it much easier to tick boxes than to give written answers requiring more complex motor co-ordination. Similarly the requirements of those who subsequently process the completed form must be taken into account. This includes the administrators who check that the form is correct. Such checking procedures may generate the need for structural compatibility between information on the form and material already in the administrative system (price catalogues, personal record files, etc.). It is also necessary to consider the requirements involved in whatever data analysis may be carried out on the form. Such requirements may be the preferences of the data processing department or they may be the limitations of a piece of hardware if electronic data capture is planned. None of this additional information will be available in a cook-book summarizing the findings from strategic research on design factors. Other procedures will be necessary for obtaining this additional information.

#### 4.3 *A procedural approach to form design*

Elsewhere the suggestion has been put forward that the production of written information can be subjected to checks which are analogous to the quality control checks which apply to the production of other items (Wright, 1979). Many of the checks suggested are empirical but the kinds of data collected and the techniques for collecting them span the range of behavioural research methodologies. They include observational field studies, survey procedures, in-depth interviews, and laboratory comparisons. Different techniques are best suited to obtaining different kinds of information about the text, the form-filler, and the other users of the form. This will be illustrated below, but there is also useful information to be gained from non-research techniques. Macdonald-Ross and Waller (1975) have shown how a consideration of alternatives and the criticism of sensitive, informed opinion can be an extremely valuable resource in improving the comprehensibility of written information.

There is only space here to sketch in some of the sorts of information that may be yielded by the four research techniques mentioned. Observational studies will indicate how the form is used, by all its various users. This research may show how the form is first encountered, which may have implications for its label or heading. If the form has to be requested across a post-office counter, it is unlikely to help matters if it is called “A widow’s industrial death benefit” or even “An

invalidity benefit." These phrases are too much of a mouthful. Observational studies are perhaps more easily conducted for forms that are used internally by a business organisation than for forms which are completed privately at home. These "domestic" forms might be better approached through the research techniques of either surveys or interviews.

Surveys can also yield information that is relevant to the content of the form. For example, they can help to determine whether specific terms will be understood by the intended readership. It is important to remember that classificatory analysis has relevance to things as well as people. Survey techniques can be applied to administrative files, to other forms, etc. For some kinds of forms, particularly at the stage where they are being revised, a survey of the clerical records showing what went wrong can be a very useful source of information. It can show where the effort in the revision needs to be concentrated. Surveys of other forms can draw the designer's attention to options about class of question or presentation style that might not otherwise be appreciated. However, one risk in such a procedure is that it may promote "in-breeding." There may be a tendency to select a way of asking questions because it is widely used rather than because that way is particularly helpful.

Surveys of administrative records appear to be an under-used resource in form design. For example, recently the Department of Health and Social Security had the splendid idea of introducing a multi-benefit claim form, whereby a single form could be used to claim several benefits. They set up a number of research projects to investigate the feasibility of such a scheme. One of the research projects might have included a survey of administrative records to find out which sets of benefits were claimed by what sort of applicants. This would have indicated which items to include on the multi-benefit form. For example, there must be very few pensioners who claim for Free School Meals. No such study was undertaken. Consequently the sub-set of benefits which were actually included on the form may limit the generality of the conclusions that can be drawn from the research. To some applicants the trial multi-benefit form may have appeared to be just a complex way of obtaining a free wig from the National Health Service (Anon., 1977). This underscores the point made earlier that the actual *design* of a form is often seen as a trivial non-issue by organisations who depend very heavily on the information produced by forms.

A third research technique is the in-depth interview. This has two very important potential benefits for form design. Such interviews can isolate concepts on forms which are difficult for the form-filler to grasp. They can also highlight factors which are relevant to decisions about sequencing the information on the form. One important aspect of completing forms both in industrial contexts and in business organisations may be the logistic availability of different kinds of information needed to answer the questions on the form. Often the sequencing on a form represents a convenient structure for the administrator, or reflects some presumed logical sequence. This is not always the most convenient for the person completing the form. Sophisticated computer analysis is being increasingly brought to bear on the data from forms. There is correspondingly less need for administrative constraints to influence the sequencing of the information. The numbers to be added up no longer need to be on successive rows if the adding is done by computer. They can be located to facilitate data collection rather than data analysis.

The use of in-depth interview techniques to explore conceptual problems is well illustrated in the work of Peel (1978). In Peel's study people were taken through a step by step analysis of how their supplementary benefit was worked out. Many problems were highlighted by this technique. For example, one concerned the difficulties people had in understanding that the benefit fulfilled a "topping-up" function. It raised a person's income to a statutory level, and so varied in amount as a function of individual financial circumstances. Many claimants, who were familiar with other welfare benefits which were given as fixed sums of money, seemed to have difficulty understanding the function of the supplementary benefit allowance. Once conceptual difficulties have been identified, laboratory-based experimental comparisons can be used to find a way round the difficulty.

A fourth research technique provides a comparison of the effects of intervening in some way, perhaps changing the language or the layout of the form. This technique can be used vicariously if the relevant comparisons are available in the research literature. On the other hand specific comparisons may need to be made between the alternatives under consideration. For example, there are a number of different ways of asking people to select multiple choice options. Requiring the form-filler to use a code number to indicate the option chosen may enable the completed form to serve as an input document for the key-punch operators in the data processing department. This elimi-

nates the need for any clerical coding of the answers. But such a system can only be cost-effective if the form-fillers respond accurately. As was outlined in section 3, increasing the complexity of the way the answer is recorded very often increases the error rate. It therefore becomes an empirical question as to whether the apparent saving is a genuine economy.

These four research methodologies can be used in determining the content of a form, determining the way the information on the form is presented, and determining whether the draft version of the form meets certain levels of adequacy. Certainly there is an increasing recognition of the need to trouble-shoot a draft form (Woof, 1976). Various trouble-shooting techniques have been outlined by Wright (1979). Readability formulae may be useful in some circumstances (see the discussion by Klare, 1976, and Rothkopf, 1976) but tend to require lengthier passages of continuous prose than are usually found on forms. For some kinds of forms it may be possible to have them completed by people from the appropriate audience for the form. This may often be the case for forms used within an organisation. For other kinds of forms, particularly where it may be difficult to check the accuracy of completion, then it may be possible to have someone complete the form as if on behalf of another person. The relevant details of this other person can be provided as a "case history." In such case histories the amount of detail, both relevant and irrelevant, needs to be typical of that which the form-filler would normally have available. There is little point in providing a sequence of "answers" which the form-filler simply has to copy onto the form.

One of the advantages of this case history technique is that it can be a very precise way of locating trouble spots. Furthermore the case histories can be designed so that they probe on behalf of a range of potential users (pensioners, widows, the disabled, etc.). This makes them a very efficient way of examining the adequacy of the form for a wide range of potential form-fillers. Alternative techniques, such as asking readers if they understood the form or even asking them specific questions about the information on the form, are less satisfactory for several reasons. On the one hand people are reluctant to admit that they do not understand what they are reading. Often they feel this somehow reflects their incompetence rather than the writer's shortcomings. On the other hand people can sometimes answer questions accurately by repeating appropriate phrases from the text, without necessarily understanding what is actually meant by their answer.

It is, of course, the case that when trouble spots are found on a form, then the draft must not only be revised but also retested. Often the first few pretesting and revision stages can be conducted quite informally. If a dozen volunteers within the form-producing organisation are willing to complete the form from "case history" data, this is often adequate to indicate whether there are any serious misunderstandings. Only after such informal testing is it worth the greater investment of effort to obtain large samples and valid estimates of the error rates that might be found with the form in practice.

This brief outline of the way different research techniques can be recruited to provide information about the design of a form is intended to be illustrative rather than exhaustive. The important point to note is that this kind of data collection is providing qualitatively very different information from that provided in the research literature. For successful form design it would seem that both kinds of research, the strategic and the tactical, are necessary. Neither on its own can be sufficient.

##### 5. *Communication between strategists and tacticians*

From the preceding discussion it might seem feasible to picture the strategic researcher pursuing "general issues" in some remote corner of an ivory tower, while the tactical researcher wrestles with the problems of interpreting these research findings as well as collecting all sorts of other information that may be needed. Such a picture has some elements of truth in it. Typically those conducting strategic research tend to be psychologists whereas the tactical decision makers tend to be graphic designers. Communication between the two professional groups tends not to be frequent. Even when an exchange of information does occur it may be a rather one-sided affair, with psychologists putting forward their research findings and designers insisting that the available research literature offers little guidance for the solution of the practical problems to hand (Macdonald-Ross, 1978).

This lack of communication between the two approaches to the design of forms has several disadvantages. There are at least three hazards which may arise when the selection of general issues for research is left entirely in the hands of the academics. One hazard is that the issue may be of no relevance to anyone other than the researcher, who may find the issue of interest solely because it appears to discriminate among models of underlying cognitive processes.

## COMPONENTS OF THE DESIGN PROCESS

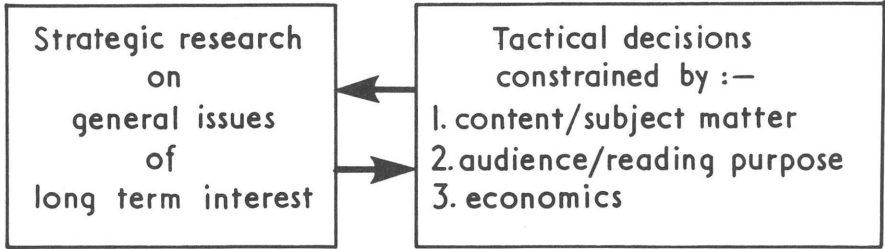


Figure 15 A synopsis of the relation between strategy and tactics in the design of forms.

These models may have no obvious relevance to the design of forms. A second hazard is that the researcher may not fully explore the boundary conditions which often limit the generality of the experimental findings. Such boundary conditions may include different target populations and various kinds of subject matter. Take as an example the studies discussed earlier showing that handwriting is less legible when people write in space character formats. In the earlier discussion it was suggested that the kinds of errors people made would not be affected by the colour or the size of the character separators. But the results came from data provided by the general public. Would the conclusions apply to programmers trained to write in these formats? Perhaps these response constraints are a device useful for writing programs but nothing else; perhaps even this advantage only applies to some programming languages. Clearly it can be a very real problem to know just how safely the research findings from an exploration of a general issue can be applied to the design of a specific form.

The third hazard in allowing, or even encouraging, the isolated growth of research on general issues is the problem of disseminating the results. Many of the studies outlined earlier have been reported in academic journals. These are not read by the working designer. So it can be little wonder if the results of such research do not seem to be implemented. The lack of contact between the strategist and the tactician can be detrimental to both endeavours.

Figure 15 illustrates an alternative approach. It emphasizes intercommunication between the two types of investigation. The specification of the issues on which research data is needed can start with the tacticians, since they are the people who know what problems actually recur, as distinct from what problems potentially might

occur. If it is the people who are trying to solve practical problems who help specify the research issues then they are likely to be interested in the outcome of that research. Therefore, at one level the problem of communicating research findings is circumvented, although of course the wider issue of making the information universally available still remains.

### 5.1 *Is communication possible between strategist and tactician?*

A rather different problem that militates against the dissemination of research findings has been raised by Macdonald-Ross and Waller (1976) who suggested that the professional training received by researchers and by graphic designers generates a particular kind of communication gap. To some extent the two groups do not speak each other's language and so have difficulty establishing a common ground for discussing issues. The solution proposed by Waller (1977-1978) is that of a "bilingual" intermediary. Waller labels this person a "transformer" with a role akin to that of a producer in some other communication medium such as film or radio. The function of such a person is to co-ordinate the many conflicting demands that arise during the production of written information, to develop techniques for finding compromise solutions, to cultivate a sensitivity to the distinction between preferred and necessary ways of presenting information.

The concept of such an intermediary can be found elsewhere. Varella (1977) uses the term "social technologist" in a similar way. Varella's emphasis tends to be on the intermediary's ability to integrate diverse research findings. In contrast, the present emphasis is on finding the centre of gravity of the conflicting demands that might arise during the process of designing a form.

It is perhaps an empirical question as to whether such intermediaries are necessary. Is it really true that researchers and designers can find no basis on which to communicate? The pessimists can point to the proceedings of interdisciplinary conferences (e.g., Kolers, Wrolstad, and Bouma, 1979) where sectional interests seem prominent and contact across boundaries seems rare. But, of course, there are counter-examples (e.g., Kolers, Wrolstad, and Bouma, 1980). Optimists can look at the outcome of collaboration between psychologists and designers. For example the team of Hartley and Burnhill have addressed the issue of the use of white space in presenting text as a means of helping the reader grasp the structure of the written information (Hartley and Burnhill, 1977b).

A related case for the need for greater interaction between pure and applied researchers has been made by Wright (1978). Pure research benefits from being set within the context of needing to explain the powerful determinants of performance discovered by applied researchers. Similarly, although differently located along the pure-applied dimension, strategic research stands to benefit from needing to respond to the issues raised by tacticians. There is a risk that such benefits might be lost if communication were only through a third party.

As the earlier discussion has shown, it would be inappropriate to conceive of the tacticians as being simply the providers of research questions and assimilators of research findings. They, too, have an active research part to play. There has already been discussion of the need for empirical information that is required to specify the content and presentation of the form. In addition the draft form will require troubleshooting. There needs to be some evaluation that the form reaches minimal standards of adequacy. It is such data collected by tactical researchers that provides the vital link, the nearly common ground, between the strategist and the tactician.

## 5.2 *The overlap of strategic and tactical research*

Figure 15 perpetrates a convenient fiction in characterizing strategic and tactical research by the graphic device of two separate boxes. A more accurate picture might have been an overlapping venn diagram. One man's tactics may be another man's strategy. The main difference between the two kinds of information is whether they have relevance beyond the immediate practical problem which prompted the collection of the information. This in some instances will depend as much on the practical problem as it does on the information obtained. For example, an organisation that has a continuing need to include questions about income on the forms it produces may find it strategically valuable to have information about how people conceptually interrelate their various sources of income. No such strategic need may exist in another organisation, although from time to time they may be concerned with questions about particular sources of income. Because of the different value that income information has to these two kinds or organisation, the research effort will vary and this will be reflected in the generality of the results obtained from the respective studies.

Another area of overlap of the strategic and tactical approaches has been discussed by Macdonald-Ross (1978). He has pointed out the

need for strategists to be concerned with explicating the skills of good tactical problem solvers. There can be little doubt that the forms designed by some people are far better than those designed by others. In an unpublished study Barnard and Wright asked people to evaluate forms from five local authorities. All forms were used to administer the same benefit scheme, nevertheless some were consistently found to be better than others (fuller details are given in Wright, 1982). Macdonald-Ross has emphasized the practical value of trying to operationalise the procedures by which a good craftsman arrives at particular solutions to design problems. As yet there is no research of this kind available in the research literature on form design, although it is an approach that has met with success in other problem solving contexts (Newall and Simon, 1972).

### 5.3 *Who does what?*

Perhaps it is now clearer what replies are appropriate when you are next shown a form and asked for "some quick comments." The preceding discussion has tried to indicate where the boundaries of a division of labour might fall when designing forms. Specifications of what to ask, and in some measure how to ask it (particularly issues about sequencing the information), can usefully come from empirical investigations by the organisation interested in the design of a particular form. Assistance in selecting which classes of question to use, which kinds of response to require, what sorts of language to avoid, perhaps even how to cope with the notes, may come from investigations undertaken outside the particular organisation producing the form. But the usefulness of such research might well depend on the flow of information between the tactical and the strategic researchers. Inevitably a final troubleshooting evaluation of the form will always be necessary. Here the onus again rests with those producing the form.

When discussing ways of ensuring that the language in a document is communicating effectively to the reader, a case was made by Wright (1980) that the ideal solution lay in the co-ordinated skills of a multi-disciplinary team. Applying this notion to the design of forms, such a team would consist of: subject matter experts who know about the specific content to be covered on the form; experts in typographic design who know about displaying printed information on the page; experts in behavioural research who know how to find and interpret the relevant research literature as well as knowing how to devise

whatever tactical investigations may be necessary; and writers who have the skill to communicate clearly and easily in writing. Obviously such teams are expensive to maintain. Nevertheless, for any organisation handling large numbers of forms it is simply an empirical question as to whether maintaining such a team would be cost-effective. This takes us back to our starting point and the benefits of good design. But at least by now it should be clearer why it is so unreasonable to expect a clerical officer to be able to sit at a desk and produce a trouble-free form. This may be a cheap production method but the maintenance costs are often excessive.

Among those who have recognized that clerical officers need some assistance to design better forms, there are people who hope that one day there might appear a do-it-yourself guide to form-design. Perhaps this hope is centered on the belief that strategic research might result in a set of simple, easily followed guidelines which would enable the secretary at her typewriter to produce a near perfect form. The preceding discussion has tried to show that such a cook-book is not merely a pipe dream, but it reflects a serious misunderstanding of the complexities of good form design. Organisations with a vested interest in the improvement of forms have two major requirements. They need both a design strategy and they need adequate tactical resources to implement that strategy.

This is the substance of a paper given at the NATO conference on Visual Presentation of Information, Netherlands, September 1978.

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